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time in the work under review, but they are all brought together here, and so focus our attention on the ninety (about) specific names (considerably over one-half) that bear ARTHUR's name as their authority; and he is also responsible for sixteen (about one-half) of the genera. However, he is not quite so extreme in this respect as MURRILL has been in his monograph of the Polyporaceae. ARTHUR has obtained part of his genera from new material and part by splitting up old genera, basing the new genera largely upon their possession of one or more of the O, I, II, III stages characteristic of the rusts. His familiarity with the rusts is such that he is able apparently, if given only the II stage, to tell what other stages it possesses, and so can place it in a genus.

Judging from this past tendency to publish new species under the old recognized genera, a tendency he has not yet entirely lost, I expressed doubt to the late Professor UNDERWOOD, editor of the *Flora*, that ARTHUR would follow his Vienna paper in his treatment of the North American Uredinales. As he did follow it, however, I promptly received from UNDERWOOD the following: "Some time ago you charged that ARTHUR was not possessed of the courage of his convictions in regard to his publication of genera in the Uredinales. I commend to your prayerful attention the second part of Vol. VII of *North American flora*, issued March 6, and move that it is time to have a retraction of that charge." I herewith publicly make that retraction; but what will become of this nomenclature when some ambitious name-juggler revises our rusts fifty years hence, or possibly even after the next botanical congress!—G. P. CLINTON.

NOTES FOR STUDENTS

Turgor and osmotic pressure.—The relation between these stands in great need of accurate study. LEPESCHKIN, a few months ago, discussed the matter before the German Botanical Society.² After reviewing the terminology, he designates as turgor and turgescence the condition of tenseness of the tissues due to internal pressure in the cells. For quantitative purposes he defines as a turgor pressure (*Turgordruck*) the total pressure exercised by "cell contents" upon the "cell walls;" but he evidently means by *Zellinhalt* the cell sap, for he explains that the *Zellwände* must be of plasmatic nature. By turgor tension (*Turgordehnung*) he designates the elastic elongation of the walls in any dimension, wrought by turgor pressure. This only partly accords with the best usage in this country, where turgidity rather than turgescence names the condition, and turgor the internal pressure which produces turgidity, while turgor tension has seldom been considered quantitatively. LEPESCHKIN then analyses turgor pressure into four components: (a) surface tension (*Zentraldruck*), varying between 0.016 and 1.6 atmospheres, with a variation of 10–12 per cent.; (b) swelling of the plasma (*Quellungsdruck*); (c) the osmotic pressure of substances dissolved in the plasma; and (d) the osmotic pressure of the cell sap and the wall

² LEPESCHKIN, W. W., Ueber den Turgordruck der vacuolisierten Zellen. Ber. Deutsch. Bot. Gesells. 26a:198. 1908.

liquids. But since neither *b* nor *c*, as the author himself points out, can exercise any effect on turgor pressure, it is difficult to see why they should be reckoned as components. The study of the osmotic pressure of the solutes in cell sap and wall is carried out with a show of mathematical formulae that look formidable, but the data are really not yet adequate for exactness. The experimental results show that the observed osmotic pressure is always less than the calculated, which is due to the greater or less but general permeability of the protoplasts, a feature too much overlooked hitherto, though clearly pointed out by various investigators and *a priori* obvious. The effects of temperature changes, especially between 0° and 20°C., were also examined. A warning against conclusions based on the exclusive use of KNO_3 as a plasmolytic agent without correction for permeability is given.

In a later paper,³ LEPESCHKIN reports the results of a study of the permeability of the pulvinus cells of *Phaseolus* and *Mimosa*, in which this proves to be surprisingly high. The solutes (except sugar) escape so rapidly when the tissues are brought into water, and especially into running water, as to reduce the apparent osmotic pressure (determined by the isotonic coefficient method) by 25 to 50 per cent. A change in the permeability of the plasma membranes may alter the turgor pressure by several atmospheres. LEPESCHKIN proposes to show in another article that such changes really occur (as has been hitherto assumed) under the action of various agents.—C. R. B.

The blood of plants.—PALLADIN'S preliminary paper⁴ bears a rather striking title, which will be just enough if the theory proposed is fully established. Certain colorless chromogens, probably products of protein decomposition, have been found in plants, and these become pigments (already familiar to common observation in various discolorations produced on cutting or crushing) under the action of oxygen in the presence of oxidases. These respiratory enzymes are therefore to be considered as pigment producers, and the respiratory pigments doubtless include a number of pigments already known, such as those of the indigo plants. PALLADIN proposes to call all of them, irrespective of their chemical composition, phytohematins, in recognition of the identity of their physiological significance with that of the hematin of the blood. To show this it was necessary to find reductases in plant as in animal tissues, and PALLADIN announces their discovery. These enzymes reduce the respiratory pigments, which then go on down to CO_2 , and H_2O , etc. The following scheme shows the relation of the various respiratory processes:

³ LEPESCHKIN, W. W., Ueber die osmotischen Eigenschaften und den Turgordruck der Blattgelenkzellen der Leguminosen. Ber. Deutsch. Bot. Gesells. **26a**:231-238. 1908.

⁴ PALLADIN, W., Das Blut der Pflanzen. Ber. Deutsch. Bot. Gesells. **26a**:125-132. 1908.